



TITLE OF THE INVENTION  
INFORMATION PROCESSING SYSTEM AND INFORMATION  
PROCESSING METHOD

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application is based upon and claims the benefit of priority from the prior Japanese Patent Application No. 2003-043030, filed February 20, 2003, the entire contents of which are incorporated herein by reference.

10 BACKGROUND OF THE INVENTION

1. Field of the Invention

15 The present invention relates to an information processing system for encryption/decryption of digital information, or in particular to an information processing system and an information processing method for supplying power through a serial bus such as a USB terminal.

2. Description of the Related Art

20 The recent progress of the digital technologies has promoted the development/manufacture and extended the use of the information processing system capable of encryption/decryption of digital information. Also, this digital information processing system has been reduced in size and has come to be widely used as a handy tool for handling digital information.

25 This information processing system often uses a USB (universal serial bus) terminal for communication

with other information processing systems. The USB, which is based on the communication standard and has a power supply other than a signal line, facilitates the connection and disconnection with the system 5 powered on. The USB power terminal, which is very convenient in terms of the communication standard, can also be used to supply power for the information processing system as well as the communication information.

10 As a conventional technique in this connection, Jpn. Pat. Appln. KOKAI Publication No. 2001-242965 discloses a PC (personal computer) for supplying power to a digital information device through the USB 15 terminal. Thus, power can be supplied to the digital information device, for example, through the USB terminal.

In the conventional PC described above with power supplied to an information device through the USB terminal, however, it is impossible to supply only power to the information device and to perform the 20 control operation by key operation on the part of the information device. Once the operation mode is changed to the PC mode, for example, the operation is possible only with a command issued from the PC. With the home 25 AC power supply, therefore, the normal operation with the operation switch of the information device cannot be performed, which otherwise might be possible by

supplying from the USB the DC power rectified by a power adaptor.

Specifically, in the case where power is supplied through the USB terminal from the power adaptor, the 5 information device cannot be operated by the key operation in view of the fact that the same situation prevails as if power is supplied to control the 10 operation by an application on the PC. As a result, the information device remains in standby state until a control signal is supplied to the USB terminal from an external PC. In the case where the control signal fails to be supplied, an error occurs or the standby 15 state lasts, thereby posing the problem that power cannot be supplied from the power adaptor through the USB terminal. Further, in the case where power is supplied from the USB terminal, the control operation is possible only from an external PC, and therefore 20 the control operation, even if desired, by both the operation key of the information device and the external PC cannot be performed.

#### BRIEF SUMMARY OF THE INVENTION

According to one aspect of the invention, there is provided an information processing system comprising a potential detection section which detects 25 a predetermined potential applied to a USB terminal, a power supply section which supplies the predetermined potential to each component part as a source potential

upon detection of the predetermined potential by the potential detection section, an information detection section which detects that predetermined information has been supplied to the USB terminal, and a processing section which executes, after detection of the predetermined potential by the potential detection section, the encryption process or the decryption process in accordance with at least the operating information supplied from the operation key on the body before detection of the predetermined information by the information detection section and in accordance with the predetermined information supplied to the USB terminal after detection of the predetermined information by the information detection section.

15 BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

FIG. 1 is a block diagram showing a digital data recording and reproducing apparatus according to an embodiment of this invention.

20 FIGS. 2A and 2B are diagrams for explaining an example of connection between a digital data recording and reproducing apparatus according to the invention and an external personal computer or the like.

25 FIG. 3 is a flowchart showing an example of the operation mode determining process for a digital data recording and reproducing apparatus according to the invention.

FIG. 4 is a flowchart showing another example of

the operation mode determining process for a digital data recording and reproducing apparatus according to the invention.

5 FIG. 5 is a flowchart showing still another example of the operation mode determining process for a digital data recording and reproducing apparatus according to the invention.

10 FIG. 6 is a flowchart showing yet another example of the operation mode determining process for a digital data recording and reproducing apparatus according to the invention.

#### DETAILED DESCRIPTION OF THE INVENTION

15 An information processing system according to an embodiment of the invention is explained in detail below with reference to the accompanying drawings.

20 FIG. 1 is a block diagram showing a digital data recording and reproducing apparatus according to an embodiment of this invention. FIGS. 2A and 2B are diagrams for explaining an example of connection between a digital data recording and reproducing apparatus and an external personal computer or the like.

25 An embodiment of the invention will be explained in detail with reference to the drawings. In the embodiment described below, reference is made to the digital data recording and reproducing apparatus shown in FIG. 1, as an example. In FIG. 1, the digital data

recording and reproducing apparatus 10 comprises an image/voice processing integrated device 31 connected to an image/voice input section 21 and an image/voice output section 28, a CPU 24 constituting 5 a control unit and a central processing unit connected to the image/voice processing integrated device 31, a RAM 11 constituting a storage area connected to the CPU 24, a memory card 25 constituting a removable storage medium connected to the CPU 24, a flash memory 10 32 constituting a built-in storage area connected to the CPU 24, a liquid crystal display section 30 connected to the CPU 24 for displaying the operating information and the like, and an operation switch 29 connected to the CPU 24. The digital data recording 15 and reproducing apparatus further comprises, as a feature of this invention, a USB controller 34 connected to the CPU 24, a power supply section 35 including a potential detection section connected to the USB terminal 33 through a diode, and a battery 20 connected to the power supply section 35 through a diode. The USB terminal 33 includes at least a power terminal T1, control information terminals T2, T3 and a grounding terminal T4.

The microprocessor 24 is connected with 25 an operation switch 29 having an operating input switch for voice recording, image recording, voice/image reproduction or the operation power off for the digital

data recording and reproducing apparatus 10, and  
a liquid crystal display section 30 for indicating the  
operating condition of the digital data recording and  
reproducing apparatus 10 in accordance with the input  
from the operation switch 29.

5 The nonvolatile memory card 25 is removably  
mounted in a card slot formed in the housing not shown  
of the digital data recording and reproducing  
apparatus 10.

10 Also, an A/D converter circuit 22, an encryption  
reduction circuit 23, a decryption expansion circuit 26  
and a D/A converter 27 are each configured of  
a one-chip image/voice processing integrated device  
(hereinafter referred to as the image/voice processing  
15 IC) 31.

In this configuration, the digital data recording  
and reproducing apparatus 10 making up an information  
processing system according to this invention  
performs the recording process as described below.  
20 Specifically, the image/voice input circuit 21 includes  
a microphone for collecting the music sound or the  
voice of men or acquires the image information and  
generating an analog electrical signal, and an  
amplifier circuit for amplifying an analog voice signal  
25 generated by the microphone or a CCD camera.

The analog image/voice signal generated in  
the image/voice input circuit 21, in accordance

with an initially set basic operating mode, is converted into a digital image/voice signal by an analog-to-digital converter (hereinafter referred to as the A/D converter) 22 in accordance with the 5 operating information supplied from the operation switch 29, and the digital image/voice signal is supplied to an encryption reduction circuit 23. The encryption reduction circuit 23 encrypts the digital image/voice signal, reduces the data and 10 generates a predetermined digital reduction data. The encryption reduction circuit 23 uses, as an example, the reduction technique specified in the ITU (International Telecommunication Union) standard G729A. The digital encryption reduction data generated in the 15 encryption reduction circuit 23 is recorded in the card having mounted thereon a nonvolatile semiconductor memory (hereinafter referred to as the nonvolatile memory card) 25 or a built-in flash memory 32 through a microprocessor 24. The microprocessor 24 controls the write and read operation of the digital encryption reduction data in the nonvolatile memory 25 or the 20 built-in flash memory 32, while at the same time generating the management data for the digital encryption reduction data written. 25 Further, the digital data recording and reproducing apparatus 10 constituting the information processing system according to this invention performs

the reproducing process as described below. In the digital data recording and reproducing apparatus 10, in accordance with the initially set basic operation mode, the digital encryption reduction data read from the nonvolatile memory card 25 or the flash memory 32 are expanded by the decryption expansion circuit 26, and after decryption, converted to a digital image/voice signal under the control of the microprocessor 24.

5 The digital image/voice signal generated in the decryption expansion circuit 26 is converted to an analog image/voice signal by the digital/analog converter (hereinafter referred to as the D/A converter) 27, and supplied to the image/voice output circuit 28 configured of an amplifier circuit and a speaker or a display unit thereby to perform the

10 15 reproducing operation.

Further, in the digital data recording and reproducing apparatus 10 constituting the information processing system according to the invention, in accordance with the initially set basic operation mode, the digital data read from the nonvolatile card 25 or the built-in flash memory 32 can be edited or otherwise processed in accordance with the operating information supplied from the operation switch 29.

20 25 Also, these digital processes including the recording, reproduction and editing are executed at a source potential supplied from a battery of the power supply

section of the digital data recording and reproducing apparatus 10. As an alternative, the processes can be executed by the power supplied from the source potential through the USB terminal as described later.

5 Furthermore, the operating information for these processes is usually supplied by the user operation of the operation switch 29 arranged on the body. Nevertheless, the operating information may alternatively be supplied from the PC 2, for example,

10 as an external device through the USB terminal 33.

(Operation mode determining process for the information processing system according to the invention)

15 In the digital data recording and reproducing apparatus 10 constituting the information processing system according to the invention, the source potential from the power supply section 35 may be supplied from a power adaptor or an external device through the USB terminal 33. In this case, the operating information may be supplied through the operation switch 29 on

20 the body. The operation mode determining process for the information processing system according to the invention is explained in detail below with reference to the drawings and the flowcharts. FIGS. 3 to 6 are flowcharts showing an example of the operation mode determining process for the digital data recording and

25 reproducing apparatus according to the invention.

In FIG. 2A, the digital data recording and

reproducing apparatus 10 constituting the information processing system according to the invention is connected to the power adaptor 6 which in turn is connected to an external power supply socket 7 by the 5 USB cable 9 connected to the USB terminal 33. Further, an earphone 8 is connected to the image/voice output section 28. Also, in FIG. 2B, the digital data recording and reproducing apparatus 10 constituting the information processing system according to 10 the invention is connected to an external PC 2 through a USB cable 9 connected to the USB terminal 33, for example. As an alternative, the apparatus 10 may be connected to two USB terminals, one of which is selected by the operation. With the apparatus 15 connected this way, the power supply process and the operation mode determining method will be explained sequentially with reference to the four flowcharts.

In the flowchart of FIG. 3, the digital data recording and reproducing apparatus 10, when the 20 operation switch 29 is turned on, the key mode is set as an operation mode (S11) in accordance with the initial setting recorded in the preset RAM 11 or the like or the initial setting designated by the user under the control of the CPU 24. In the key mode, the 25 operating information of the digital data recording and reproducing apparatus 10 is supplied through the operation switch 29. As an alternative, a dual mode

can be selected as an operation mode in which both the operating information supplied through the operation switch 29 and the control information supplied from the external PC 2 through the USB terminal 23 can be used  
5 as the operating information. In the dual mode, the digital data recording and reproducing apparatus 10 can be operated by the user through both the operation of the operation switch 29 on the body and the key operation from the PC 2.

10 Next, a predetermined potential (say, +5 V) at the power terminal T1 of the USB terminal 33 is detected by the potential detection section built in the power supply section 35 (S12). Then, the power supply section 35 stops supplying power through a battery,  
15 and begins to supply power based on a predetermined potential from the power terminal T1 to each part of the digital data recording and reproducing apparatus 10.

At the same time, the CPU 24 constituting  
20 a control unit detects, through the control information terminals T2, T3 of the USB terminal 33, a unique command of a control signal from the external PC 2 such as a device request signal acquired through the USB Controller 34 (S13). The operation mode is changed  
25 from the initially set key mode (or the dual mode) to the PC mode (S14). The PC mode is an operation mode in which the digital data recording and reproducing

operation in accordance with the operating information supplied from the operation key.

3. An information processing system according to claim 1, wherein the processing section is set in the 5 dual mode for executing the processing operation in accordance with both the operating information supplied from the operation key and the predetermined information supplied through the serial bus terminal.

4. An information processing system according to 10 claim 1, wherein, after the information detection section detects the predetermined information, upon detection of a drop of the predetermined potential by the potential detection section after entering the operation mode for performing the processing operation 15 in accordance with the predetermined information supplied to the serial bus terminal, the operation mode is changed to perform the processing operation in accordance with the operating information supplied from the operation key.

20 5. An information processing system according to claim 1, wherein, after the information detection section detects the predetermined information, upon detection of a drop of the predetermined potential by the potential detection section after entering the 25 operation mode for performing the processing operation in accordance with the predetermined information supplied to the serial bus terminal, the operation mode

is changed as initially set to perform the processing operation in accordance with the operating information supplied from the operation key.

6. An information processing system according to  
5 claim 1, wherein, after the information detection section detects the predetermined information, upon detection of a drop of the predetermined potential by the potential detection section after entering the operation mode for performing the processing operation  
10 in accordance with the predetermined information supplied to the serial bus terminal, the operation mode is changed as initially set to perform the processing operation in accordance with both the operating information supplied from the operation key and the  
15 predetermined information supplied through the serial bus terminal.

7. An information processing system according to  
claim 1, wherein selected one of the encryption process and the decryption process is executed in the operation mode in accordance with the predetermined information supplied to the serial bus terminal upon detection of the predetermined information by the information detection section before the lapse of a predetermined time from the detection by the potential detection  
20 section of the predetermined potential applied to the serial bus terminal, and selected one of the encryption process and the decryption process is executed in the  
25

initially set operation mode, without regard to the detection of the predetermined information, after the lapse of a predetermined time from the detection by the potential detection section of the predetermined potential applied to the serial bus terminal.

8. An information processing system according to claim 1, wherein, during the recording or reproducing operation of the processing section, selected one of the encryption process and the decryption process is executed in accordance with the initially set operation mode without regard to the presence or absence of the predetermined information detected by the information detection section.

9. An information processing system according to claim 1, wherein selected one of the encryption process and the decryption process is executed in accordance with the initially set operation mode during the recording or reproducing operation of the processing section without regard to the presence or absence of the predetermined information detected by the information detection section, and selected one of the encryption process and the decryption process is executed in accordance with the predetermined information supplied to the serial bus terminal upon detection of the predetermined information by the information detection section after the recording operation or the reproducing operation.

10. An information processing system according to  
claim 1, wherein selected one of the encryption process  
and the decryption process is executed in accordance  
with the initially set operation mode during the  
5 recording or reproducing operation of the processing  
section without regard to the presence or absence of  
the predetermined information detected by the  
information detection section, and selected one of the  
encryption process and the decryption process is  
10 executed in accordance with the predetermined  
information supplied to the serial bus terminal upon  
detection of the predetermined information by the  
information detection section after the recording  
operation or the reproducing operation.

15 11. An information processing system according to  
claim 1, wherein, as long as the processing section is  
initially set in the operation mode to be supplied with  
power from an external source, selected one of the  
encryption process and the decryption process is  
20 executed in accordance with at least the operating  
information supplied from the operation key on the  
body, without regard to whether the information  
detection section has detected the predetermined  
information or not, after detection of the  
25 predetermined potential by the potential detection  
section.

12. An information processing system according to

claim 1, wherein, as long as the processing section is initially set in the operation mode to be supplied with power from an external source, selected one of the encryption process and the decryption process is 5 executed in accordance with both the operating information supplied from the operation key on the body and the predetermined information supplied through the serial bus terminal, without regard to whether the information detection section has detected the 10 predetermined information or not, after detection of the predetermined potential by the potential detection section.

13. An information processing method comprising:  
detecting a predetermined potential applied to 15 a serial bus terminal and supplying the predetermined potential as a source potential; and  
executing, after detection of the predetermined potential, selected one of the encryption process and the decryption process in accordance with at least the 20 operating information supplied from the operating key arranged on the body before detection of the predetermined information supplied through the serial bus terminal, and in accordance with the predetermined information after detection of the predetermined 25 information.

14. An information processing method according to claim 13, wherein selected one of the encryption

process and the decryption process is executed in the operation mode in accordance with the predetermined information supplied to the serial bus terminal before the lapse of a predetermined time from the detection of 5 the predetermined potential applied to the serial bus terminal, and selected one of the encryption process and the decryption process is executed according to the initially set operation mode, without regard to whether the predetermined information has been detected or not, 10 after the lapse of a predetermined time from the detection of the predetermined potential applied to the serial bus terminal.

15. An information processing method according to claim 13, wherein, during recording or reproducing operation of the processing section, selected one of the encryption process and the decryption process is executed in accordance with the initially set operation mode without regard to the presence or absence of the predetermined information.

20. An information processing method according to claim 13, wherein, as long as the operation mode is initially set to supply power from an external source, selected one of the encryption process and the decryption process is executed in accordance with at 25 least the operating information supplied from the operation key on the body, without regard to whether the predetermined information supplied to the serial

bus terminal has been detected or not after detection of the predetermined potential.

17. An information processing system comprising:  
5                    a potential detection section which detects a predetermined potential applied to an input interface;

10                    a power supply section which supplies the predetermined potential to each component part as a source potential upon detection of the predetermined potential by the potential detection section;

15                    an information detection section which detects the predetermined information supplied to the input interface; and

20                    a processing section which processes the information, subsequent to the detection of the predetermined potential by the potential detection section, in accordance with at least the operating information supplied from the operating key on the body before detection of the predetermined information by the information detection section, and in accordance with the predetermined information supplied to the input interface after detection of the predetermined information by the information detection section.